Proposed Regulation on the Commercialization of Alternative Diesel Fuels

California Air Resources Board
Industrial Strategies Division
Oil and Gas and GHG Mitigation Branch

Overview

- Need for ADF Proposal
- Regulatory Development
- Specific Application to Biodiesel
- Impacts & Benefits
- Potential 15-Day Changes

Need for ADF Proposal

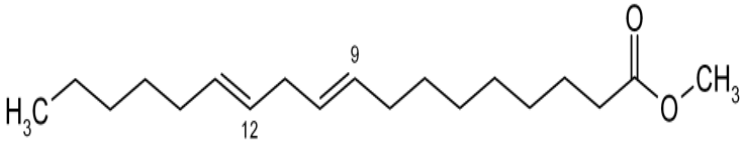
What Are ADFs?

- Alternative Diesel Fuels are diesel substitutes:
  - Not liquid hydrocarbons & no ARB fuel specification
- Examples of ADFs
  - Biodiesel (completing evaluation), Dimethyl Ether (undergoing evaluation)
- Not ADFs
  - Renewable diesel, Natural Gas
- ADF Blends
  - Typically labeled “BXX” where XX is the percent ADF in a blend
  - Example: B10 is 10 percent biodiesel, 90 percent diesel

Comparison of Biodiesel & Renewable Diesel

Biodiesel (ADF)

- Fatty acid mono-alkyl esters



Renewable Diesel (non-ADF)

- Hydrocarbon alkanes
  (indistinguishable from conventional diesel)

Complementary Fuels

- Both generally low carbon, can use same feedstocks, different production process
- Substantial GHG, criteria, toxics reductions
- Biodiesel has good lubricity
- Renewable diesel has good cold temp. performance

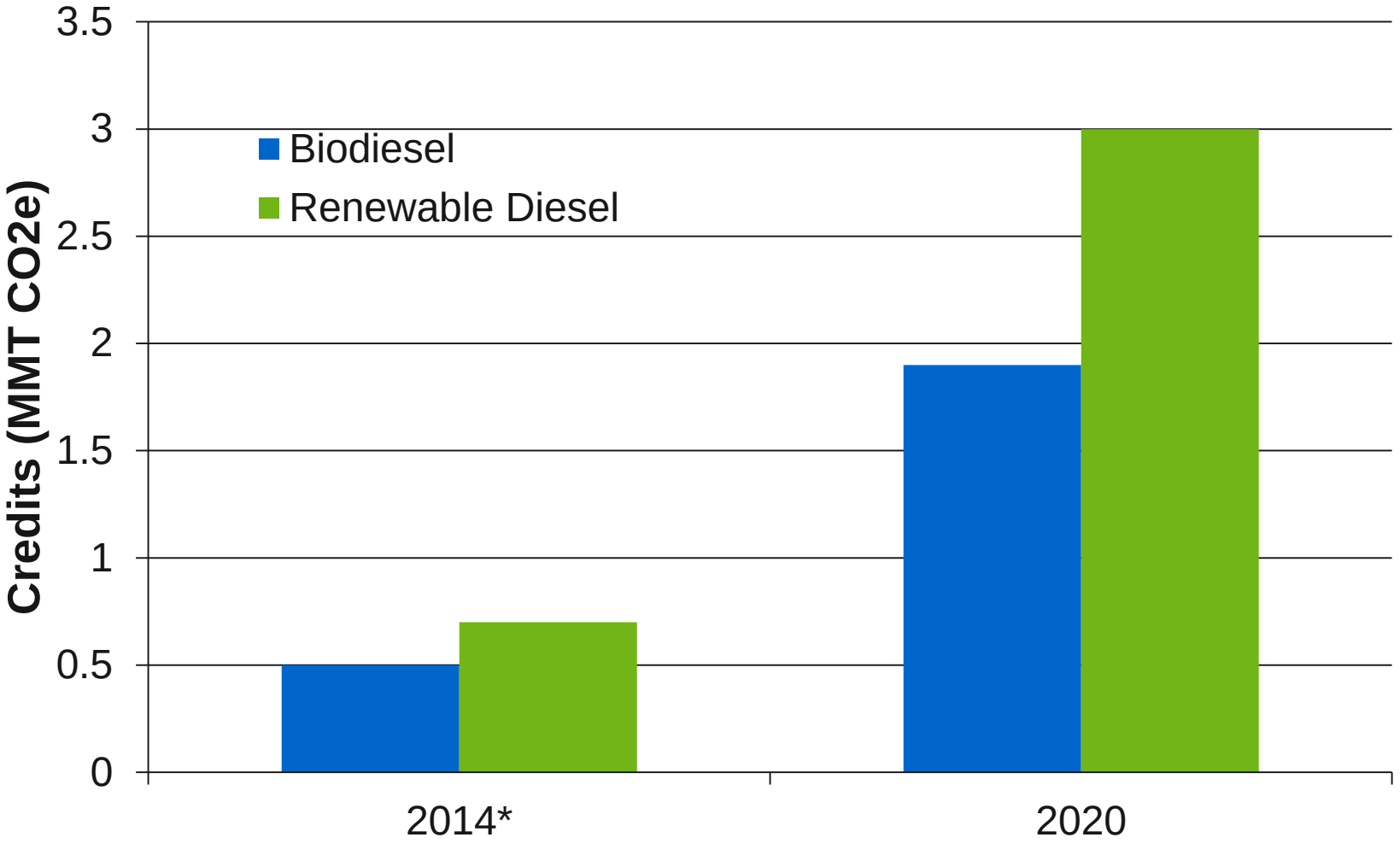
Why is ADF Proposal Needed?

- Alternative diesel fuels bring significant benefits
- State (LCFS) and federal (RFS) programs incent low carbon ADF fuels in California
- Emerging ADFs need market certainty, clear ground rules for commercialization in CA
- Need to maintain environmental & public health protections
- Court ruling in *POET* case reinforced need for an ADF regulation to address biodiesel NOx emissions

LCFS Attracts ADFs & Other Low Carbon Fuels

- Biodiesel and renewable diesel have benefits:
  - Both lower GHG, PM, toxic emissions
  - Renewable diesel also decreases NOx
- Biodiesel can increase NOx in older heavy-duty vehicles
- Proposal applies lessons learned during biodiesel testing, realizes benefits while preventing NOx increase

LCFS Attracts ADFs & Other Low Carbon Fuels (cont.)



*** Through first 3 Quarters of 2014**

Emerging ADFs Need Clear Ground Rules

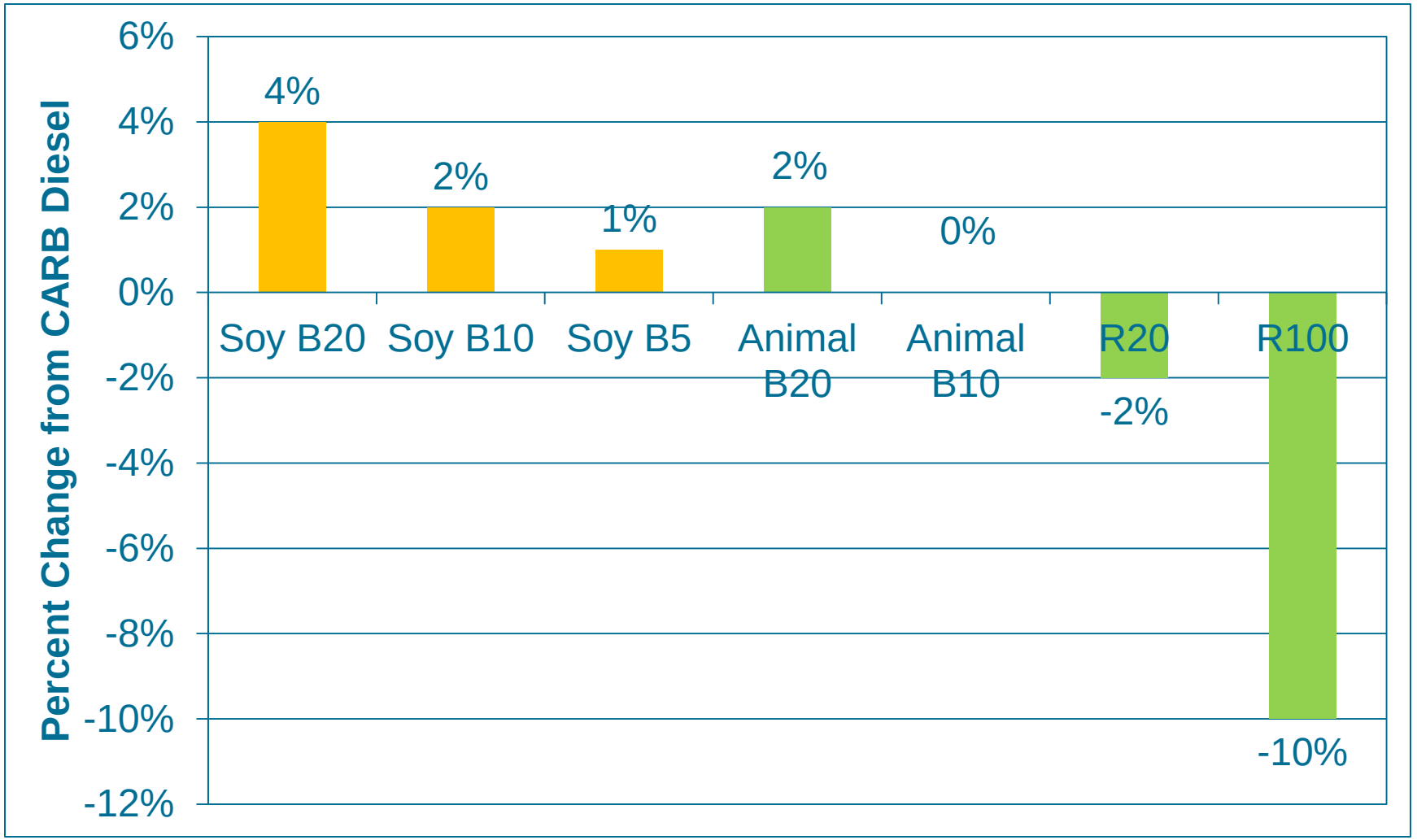
- Current evaluation process comprises elements from various regulations and statutes
- ADF proposal codifies separate elements and procedures into one regulation
- Sets clear ground rules for application, review, approval
- Provides market certainty
- Encourage emerging fuels like DME

Regulatory Development

Extensive Public Development Process

- Eight years of biodiesel emissions testing, ~$3 million on test programs
- Literature review, independent statistical analysis
- Thirteen public meetings to discuss test protocols, results, multimedia evaluation
- Seven public workshops to discuss ADF proposal (2013 – 2014)
- Comprehensive biodiesel testing (including different blends and types) and public participation informed ADF proposal

NOx Effect of Biodiesel and Renewable Diesel Fuels in Older HD Vehicles*



*NOx effect measured in pre-2010 engines

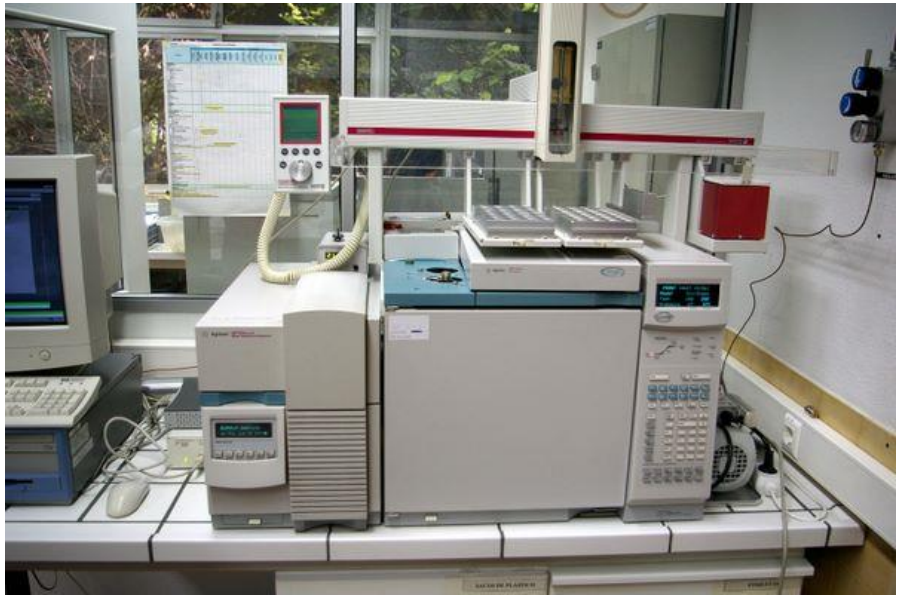
Objectives of Proposed Regulation

- Works with LCFS to advance production and import of low carbon ADFs
- Establish clear pathway for commercialization of biodiesel and emerging ADFs
- Maintain public health and air quality protections
- Prevent NOx emission increases from biodiesel use

ADF Proposal Overview

- Two main provisions
  - Three stage evaluation of ADFs and effects on the environment
    - Follows ADFs from lab to demonstration to commercial scale
    - Protects environment during evaluation
    - May lead to additional controls or simply reporting depending on ADF environmental effects
  - Fuel specifications and in-use requirements for biodiesel as first ADF
    - Biodiesel undergoing multimedia evaluation, near completion
    - Evaluation of biodiesel was model for phase-in requirements

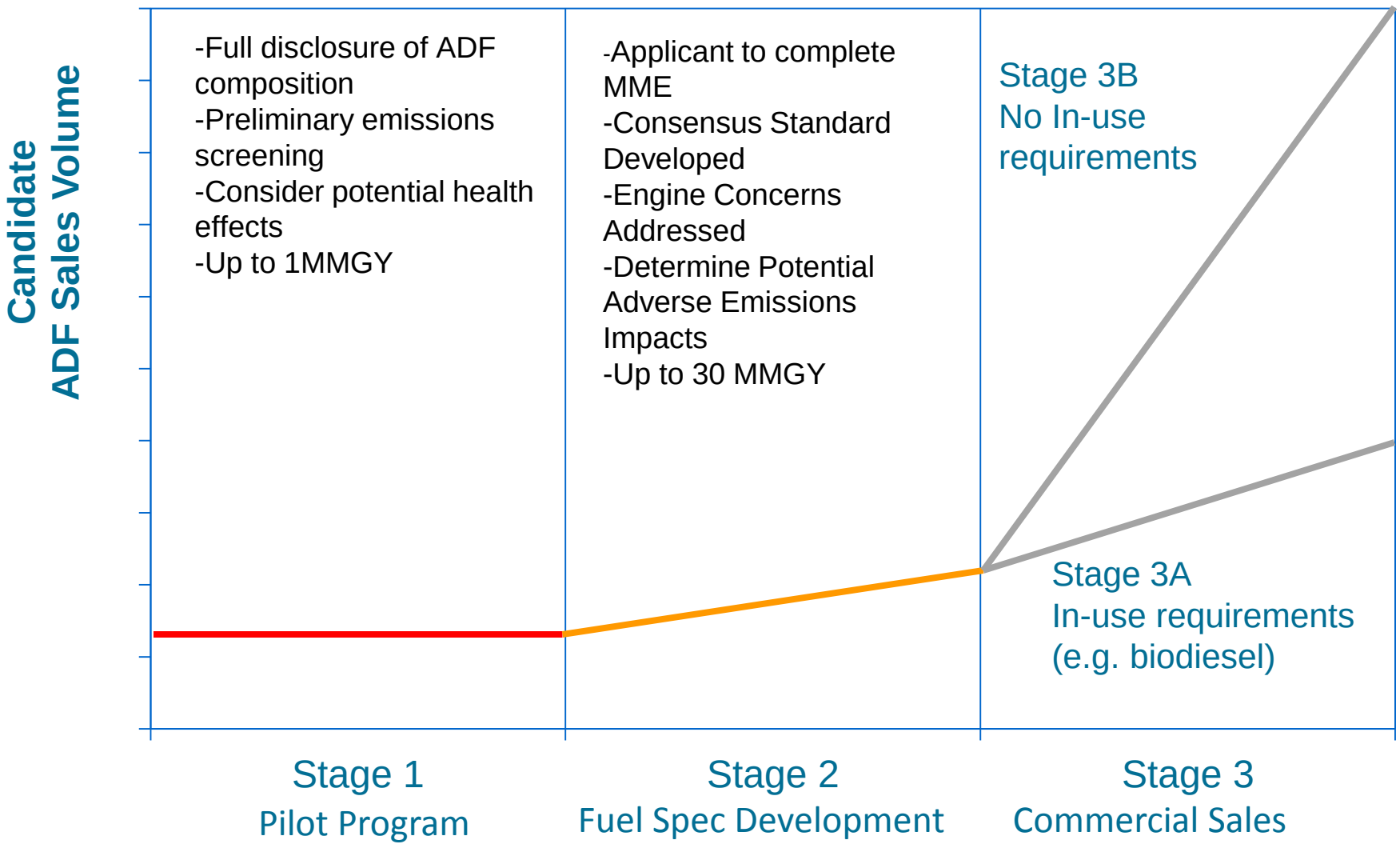
Evaluation Process for Emerging ADFs



General Three-Stage Process for Emerging ADFs

- Three-stage process to evaluate environmental impacts of emerging ADFs prior to widespread use
- Multimedia Evaluation determines potential adverse emissions impacts for pollutant(s) of concern
  - analysis considers offsetting factors
  - need for in-use requirements and fuel specifications
- In-use requirements including Pollutant Control Level control adverse emissions
- Establishes safeguards to maintain air quality protections

General Three-Stage Process for Emerging ADFs



Specific Application to Biodiesel

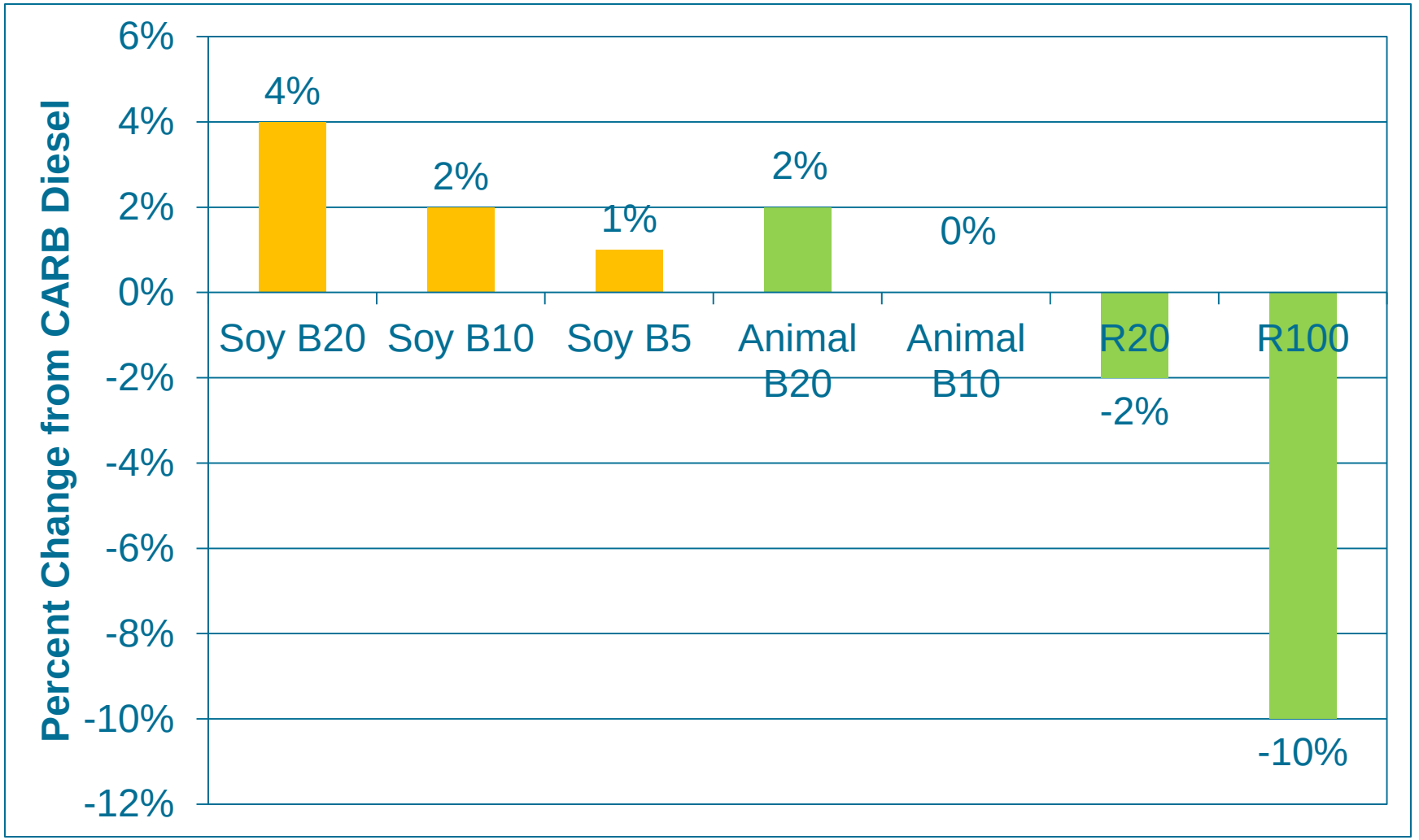
Summary of Biodiesel Requirements

- Reporting provisions begin in 2016
- In-use requirements begin in 2018
- Certification procedures included in proposal
  - Allow for innovative additives, feedstocks, production
- In-use requirements sunset once new vehicles comprise 90 percent of on-road HD fleet; ~2023
- Program review by 2020

Summary of Biodiesel Requirements (cont.)

- Biodiesel limited to B5 or B10 per gallon depending on feedstock, season
  - Feedstocks distinguished by cetane number, higher cetane leads to lower NOx emissions, higher blends allowed
  - Additives allow higher blends up to B20
- Light and medium-duty, and new heavy-duty diesel vehicles shown not to increase NOx with biodiesel use
  - SCR controls in heavy duty eliminate NOx increase (NTDE)
  - Exemptions granted on a case-by-case basis

NOx Effect of Biodiesel and Renewable Diesel Fuels *in Older HD Vehicles**



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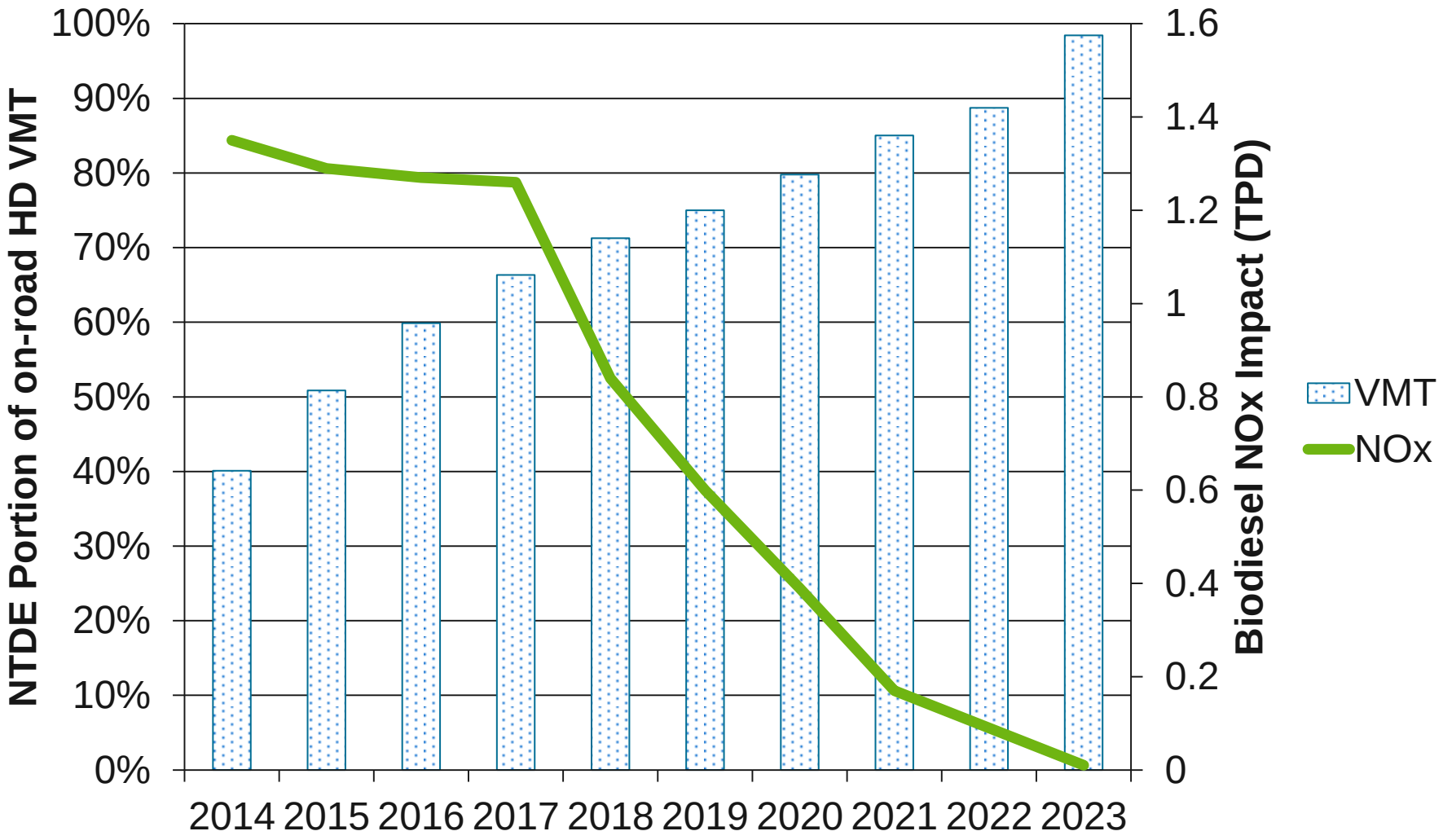
Offsetting Factors that Reduce Biodiesel NOx

- Primary market for biodiesel is heavy-duty vehicles
- Renewable diesel decreases NOx compared to conventional diesel, offsets NOx from biodiesel
- Renewable diesel use has increased significantly and expected to increase over time.
- Newer HD vehicles (2010+), passenger vehicles no increased NOx
- Offsetting factors expected to reduce biodiesel NOx emissions over time, controls needed in interim

Fleet Turnover = Long-term Biodiesel Control Unnecessary



Biodiesel Compliance Options

- Blend at or below B5
- High cetane feedstock, winter, blend up to B10
- Targeted fleet sales, blend up to B20
- Use additive, blend up to B20
- NOx control level for biodiesel:

NOx Control Levels	Per-Gal Blend Limit (April 1 to October 31)	Per-Gal Blend Limit (November 1 to March 31)
Low Cetane BD (<56)	B5	B10
High Cetane BD (≥56)	B10	B10

Review of Biodiesel Blend Limits

- Program review to be completed by 2020
  - Evaluate adoption rate of SCR in off-road diesel fleet
  - Assess projected volumes of biodiesel, renewable diesel
  - Review will ensure proposal effectively protects emissions program
- Blend limits for biodiesel sunset once HD fleet penetration exceeds 90 percent model yr 2010+

Impacts and Benefits

ADF & LCFS Environmental Impacts: Background

- One Draft Environmental Analysis was prepared for both Proposed LCFS & ADF Regulations.

- Existing regulatory and environmental setting in 2014 is used as baseline for the analysis.

ADF & LCFS Environmental Impacts: Results

- Beneficial Impacts:
  - GHGs, air quality, and energy
- Less-than-significant adverse impacts
- Potentially significant adverse impacts:
  - Some related to long-term changes in fuel production and supply
  - Others related to construction of new facilities, and shorter duration
- Significant cumulative impacts also identified for some resources.

Economic Impacts of ADF & LCFS

- Two economic evaluations were completed:
  - Statewide macroeconomic effects of LCFS + ADF proposals
  - Evaluation of direct costs of ADF proposal
- Macroeconomic evaluation used REMI model, shows very small impacts on employment
- Direct costs of ADF proposal expected to be ~1/10 of a cent per gallon of B5 diesel in 2018, decreasing to zero by ~2023
- Challenges for small producers reliant on sales of higher biodiesel blends

Benefits of ADFs

- Can have lower NOx, PM, toxic risk
  - Biodiesel, renewable diesel and DME reduce PM
  - Renewable diesel reduces NOx
  - Reductions in localized toxic exposure
- Generally have lower GHG emissions
- Reduce petroleum use - can help achieve 2020-2030 goals for GHGs, criteria, toxics
- Energy security
  - Biodiesel derived from feedstocks primarily sourced in USA
  - DME derived from domestic natural gas, methanol, or biomethane

Potential 15-Day Changes

Potential 15-day Changes

- Further blend level flexibility for captive fleets
- Clarification of certification procedures
- Definitional changes
- Minor clarifications and corrections
- Timeline will mirror LCFS

Staff Recommendation

- No Board adoption recommended today
- Direct staff to continue working with stakeholders to refine proposal
- Coordinate with development of LCFS regulation

Next Steps

- Complete environmental analysis document
- Respond to comments on environmental analysis
- Complete biodiesel multimedia and peer review
- 15-day changes